

WHAT IS CLAIMED IS:

1. A zeolite of the ZSM-12 type, especially for the hydro-isomerization of higher paraffins, which

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- (a) has a primary crystal size of $\leq 0.1 \mu\text{m}$; and
- (b) a specific volume, determined by mercury porosimetry at a maximum pressure of 4000 bar, of 30-200 mm^3/g in a pore radius range of 4-10 nm; and

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- (c) prepared from a synthesis gel composition comprising

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- c1) an aluminum source
- c2) precipitated silica as a silicon source
- c3) TEA^+ as a template
- c4) an alkali metal and/or alkaline earth metal ion source M having the valency n;
- c5) in which the molar $\text{H}_2\text{O}:\text{SiO}_2$ ratio is selected between 5 and 15.

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2. The zeolite as claimed in claim 1, characterized in that the zeolite has a specific volume, determined by nitrogen porosimetry in a pore radius range of 3-20 nm, of 0.05-0.40 cm^3/g .

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3. The zeolite as claimed in claim 1 or 2, characterized in that a molar $\text{SiO}_2/\text{Al}_2\text{O}_3$ ratio of from about 50 to 150 has been established in the synthesis gel composition.

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4. The zeolite as claimed in one of the preceding claims, characterized in that a molar $\text{M}_{2/n}\text{O}:\text{SiO}_2$ ratio of from 0.01 to 0.045 has been established in the synthesis gel composition in an oxidic preparation method.

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5. The zeolite as claimed in one of the preceding claims, characterized in that the primary crystals have been combined to agglomerates in a proportion of at least 30%,

preferably at least 60%, especially preferably at least 90%.

5 6. The zeolite as claimed in one of the preceding claims, characterized in that the primary crystals have a mean diameter of from about 10 to 70 nm, in particular from about 30 to 50 nm.

10 7. The zeolite as claimed in one of the preceding claims, characterized in that the agglomerates have cavities accessible from the agglomerate surface or interstices between the primary crystals.

15 8. A catalyst, especially for the hydroisomerization of higher paraffins, comprising a zeolite of the ZSM-12 type as claimed in one of claims 1 to 7.

20 9. The catalyst as claimed in claim 8, characterized in that the catalyst is in lump form.

25 10. The catalyst as claimed in claim 8 or 9, characterized in that the catalyst comprises a binder in an amount of from 10 to 90% by weight, preferably from 20 to 70% by weight, based on the total weight of the catalyst.

11. The catalyst as claimed in one of claims 8 to 10, characterized in that the catalyst has been laden with at least one catalytically active component.

30 12. The catalyst as claimed in claim 11, characterized in that the at least one catalytically active component is a transition group metal.

35 13. The catalyst as claimed in claim 12, characterized in that the transition group metal is a noble metal.

14. The catalyst as claimed in claim 13, characterized in

that the noble metal is platinum.

15. The catalyst as claimed in one of claims 11 to 14, characterized in that the catalytically active component is present in the catalyst in a proportion of from 0.01 to 40% by weight based on the total weight of the catalyst.

16. A process for producing a zeolite of the ZSM-12 type as claimed in one of claims 1 to 7, in which

a synthesis gel is produced which comprises, in aqueous solution or suspension:

- a1) an aluminum source;
- a2) precipitated silica as a silicon source;
- a3) TEA⁺ as a template;
- a4) an alkali metal and/or alkaline earth metal ion source M having the valency n;
- a5) the molar H₂O:SiO₂ ratio is set within the range from 5 to 15,

the synthesis gel is crystallized under hydrothermal conditions so as to obtain a solid;
the solid is removed, and
the solid is optionally washed and dried.

17. The process as claimed in claim 16, characterized in that the molar M_{n/2}O:SiO₂ ratio in the synthesis gel composition is established within the range from 0.01 to 0.045.

18. The process as claimed in claim 16 or 17, characterized in that the molar SiO₂/Al₂O₃ ratio is established within the range from 50 to 150.

19. The process as claimed in one of claims 16 to 18, characterized in that the crystallization of the synthesis gel is carried out at temperatures of from about 120 to

200°C, in particular from about 140 to 180°C.

20. The process as claimed in one of claims 16 to 19, characterized in that the solid is washed with demineralized water until the washing water has an electrical conductivity of less than 100 µS/cm.

21. The process as claimed in one of claims 16 to 21, characterized in that the crystallization time is from about 50 to 500 h, in particular from about 100 to 250 h.

22. The process as claimed in one of claims 16 to 21, characterized in that the solid, after the drying, is comminuted, especially granulated or ground and calcined.

23. The process as claimed in claim 22, characterized in that the calcination is carried out at a temperature of from 400 to 700°C, preferably from 500 to 600°C, for a period of from 3 to 12 h, preferably from 3 to 6 h.

24. The process as claimed in one of claims 16 to 23, characterized in that exchangeable cations present in the zeolite of the ZSM-12 type are exchanged by treating with an aqueous solution of an ammonium compound or of an acid, and the solid obtained after the ion exchange is washed, dried and subsequently calcined.

25. The process as claimed in one of claims 16 to 24, characterized in that the zeolite of the ZSM-12 type is shaped to a molding.

26. The process as claimed in claim 25, characterized in that a binder is added to the zeolite of the ZSM-12 type for the shaping to a molding, preferably in an amount of from 10 to 90% by weight, in particular from 20 to 70% by weight, based on the total weight of the catalyst.

27. The process as claimed in one of claims 25 or 26, characterized in that the molding is laden with at least one transition group metal.

5 28. The process as claimed in claim 27, characterized in that the transition group metal is a noble metal, especially platinum.

10 29. The use of a zeolite of the ZSM-12 type as claimed in one of claims 1 to 7 and/or of a catalyst as claimed in one of claims 8 to 15 for converting organic compounds.

15 30. The use as claimed in claim 29, characterized in that the conversion of organic compounds is a reforming, a catalytic or hydrogenating cracking, an isomerization or hydroisomerization of n-paraffins or naphthenes, an oligomerization or polymerization of compounds having olefinic or acetylenic carbon, an alkylation, a transalkylation, an isomerization or disproportionation of aromatics and alkyl-
20 substituted aromatics, a dehydrogenation or hydrogenation, a dehydration or hydration, an alkylation or isomerization of olefins, a desulfuration, a conversion of alcohols and ethers to hydrocarbons, a conversion of paraffins or olefins to aromatics, or a lowering of the flow point of
25 feedstocks such as gas oils.

31. The use as claimed in one of claims 29 or 30, characterized in that the catalyst is used for the hydroisomerization of higher paraffins, in particular
30 n-paraffins having more than 5 carbon atoms, preferably having at least 7 carbon atoms.

32. The use as claimed in one of claims 29 to 31, characterized in that the hydroisomerization is carried out in
35 the presence of aromatics, in particular benzene.

33. The use as claimed in one of claims 29 to 32, charac-

terized in that the hydroisomerization is carried out at temperatures below 290°C, preferably at from about 230 to 260°C, in particular at about 250°C.

- 5 34. The use as claimed in one of claims 29 to 33, characterized in that the hydroisomerization is carried out at a pressure in the range from 1 to 50 bar, a liquid hourly space velocity (LHSV) of from about 0.1 to 10 l per hour of higher paraffins per liter of catalyst.